



Development of a Novel Kneepad for Mining and other Kneeling-intensive Occupations



Background

- In 2007, 84 knee injuries were reported to MSHA for seam heights of 30" – 54".
- The average cost per knee injury is \$13,121.
- Thus, for 2007, the financial burden of knee injuries was more than \$1 million.
- Large forces and stresses are transmitted to the knee while kneeling and crawling in low-seam mines.
- A need exists to improve the design of kneepads currently utilized in low-seam coal industry.

Study Objective

- Many types of kneepads exist in low-seam mining. (Figure 1)
- Our laboratory measured the efficacy of kneepads by evaluating the forces, stresses, and moments at the knee while in postures associated with low-seam mining.
- The objective of the current study is to design a novel kneepad that:
 1. reduces the forces, stresses, and moments at the knee while in postures associated with low-seam mining;
 2. is durable enough to withstand the mining environment; and
 3. is well-accepted by the mine workers.



Figure 1. Four kneepads used for low-seam mining

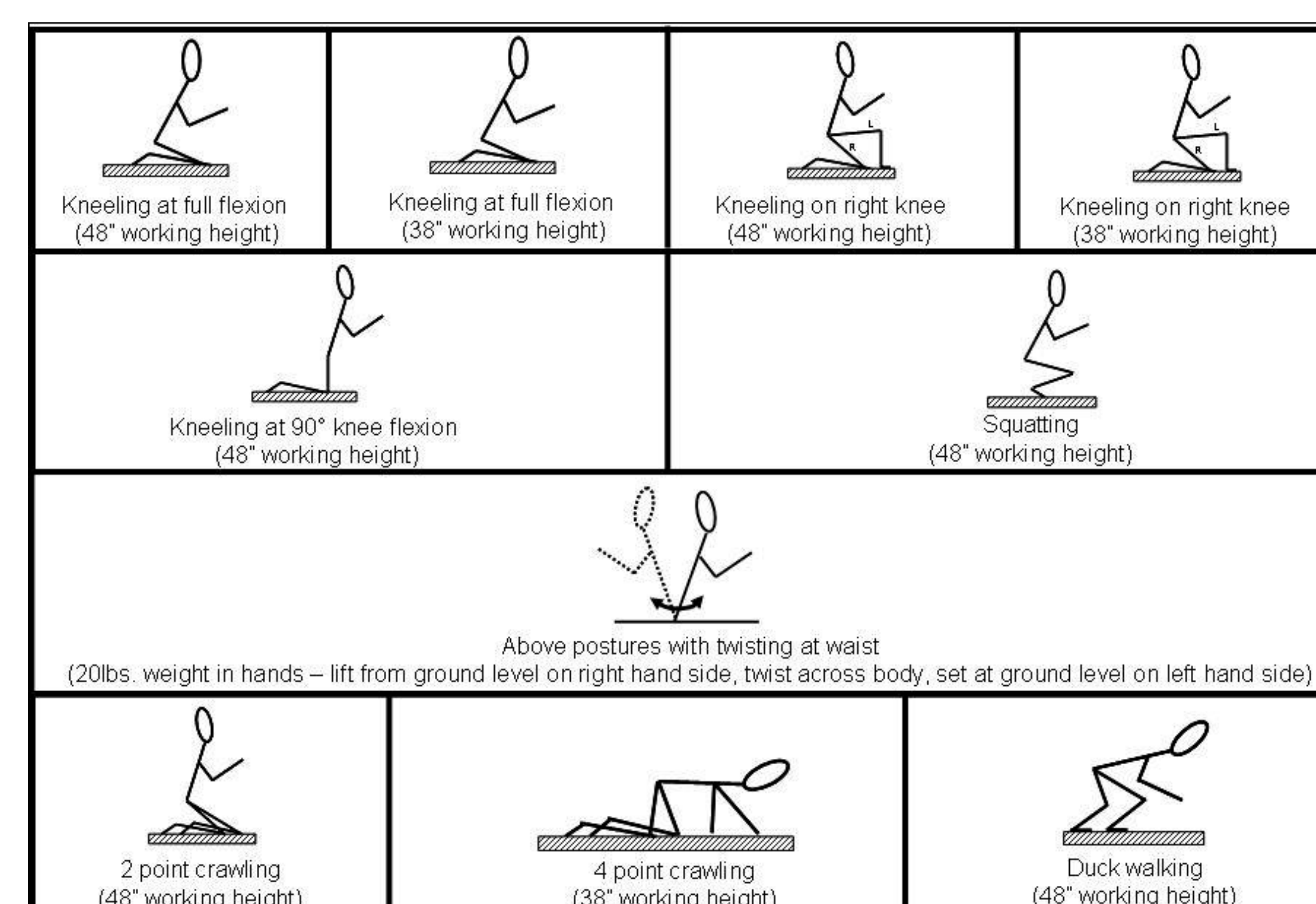
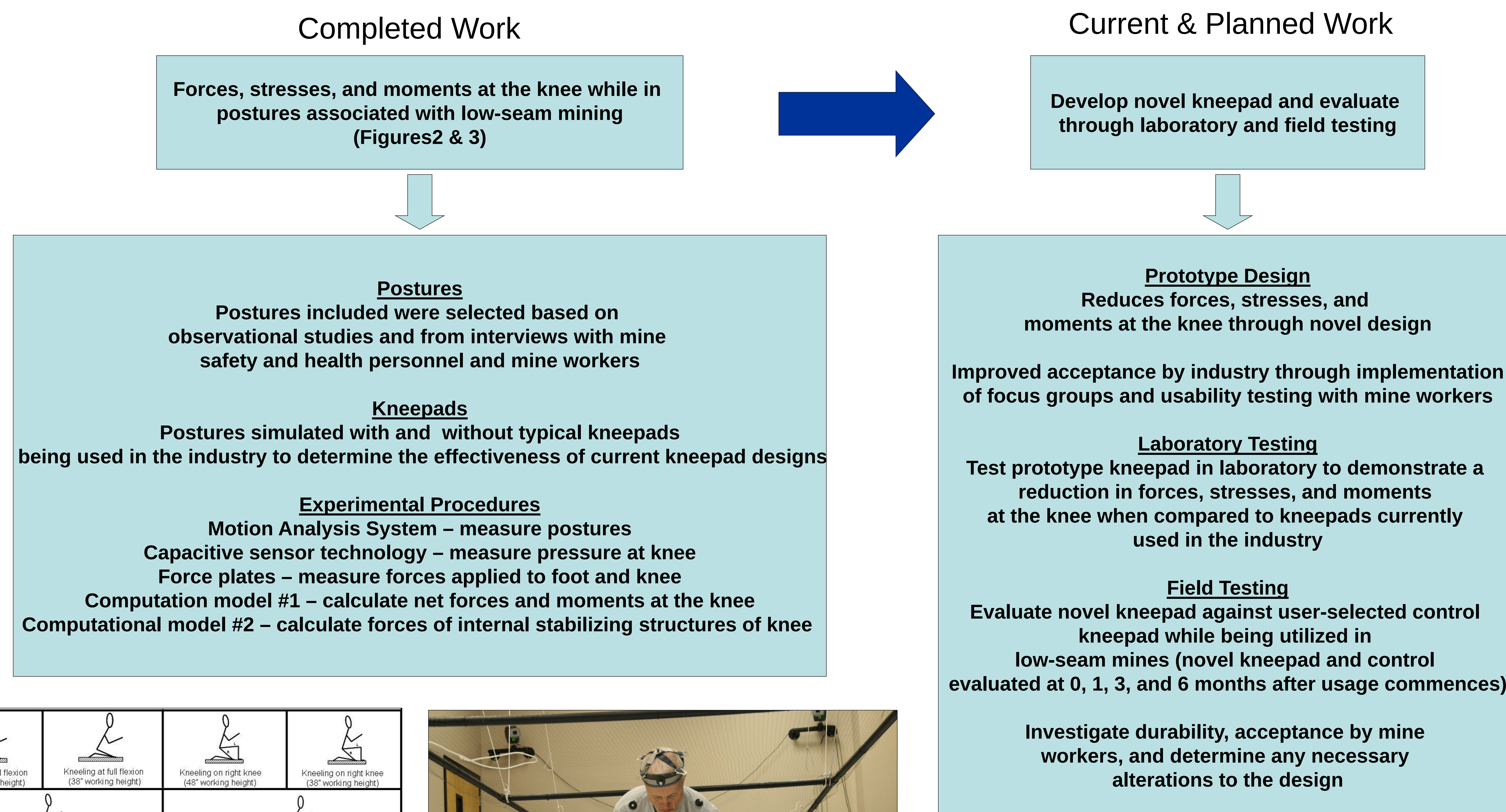


Figure 2. Postures evaluated in laboratory study



Figure 3. Subject simulating mining posture

Overview of Approach



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